MAP and Missouri Schools:
A Consequential Validity Study

Survey Report Sampling Design

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Sampling Design

The Assessment Resource Center (ARC) contracted with the Missouri Department of Elementary and Secondary Education (DESE) to conduct a multi-year study of the consequences of the Missouri Assessment Program (MAP). Following the initial focus group phase of the study, the ARC research team selected seven different groups to survey representing a diversity of MAP stakeholders from around the state of Missouri. The distinct groups—students, parents, teachers, principals, superintendents, school board members, and DESE/Regional Professional Development Center (RPDC) staff—were chosen after a review of existing No Child Left Behind (NCLB)-related testing literature and an extensive series of statewide guided conversation groups focused on the related questions of "What are the intended and unintended consequences of MAP/NCLB testing in Missouri?"

For teachers and students, the two groups that directly administer and take the MAP/NCLB, this testing affects their everyday world in significant and obvious ways. For other groups, such as principals and superintendents, MAP/NCLB is a major force in shaping the curriculum, instruction, and evaluation policies that they are charged with administering. On the strength of focus group input, DESE/RPDC was identified as another key stakeholder group. In their own crucial ways, DESE staff and RPDC staff are both involved with teacher professional development in the areas of curriculum, instruction, and evaluation. Lastly, two public stakeholder groups—parents and school board members—were selected for survey administration. Parents may offer a unique perspective as they are situated both in the community and the school via their children. Similarly, school board members are asked to balance important community and school interests.

This Sampling Design describes how a multi-level stratified cluster design was utilized to select those persons to receive a survey. This approach takes into account the following: both school district- and building-level data; stratification by location (rural to urban) for the student, teacher, and principal groups; stratification by free and reduced lunch as a proxy for socioeconomic status for the student group; and the use of cluster sampling for teachers and students where school buildings are the "cluster" holding the units of analysis (individuals). Teacher surveys were administered to every teacher in the building of a randomly selected school, while student surveys were mailed to the school building's principal with specific instructions for random selection of a classroom to receive the surveys. For the superintendent, principal, and school board member groups, the surveys were administered directly to the individuals. The remaining two surveys (parents and DESE/RPDC staff) will be administered in spring of 2008; however, the surveys are developed and sampling strategies defined as explained below.

Description of Dataset

The Missouri Department of Elementary and Secondary Education (DESE) provided the data used to draw the samples discussed in this report. There are two levels of data necessary for sampling the selected groups to be surveyed, district-level data for the superintendents and school board members and building-level data for the students, principals, teachers, and parents. The DESE/RPDC staff surveys were administered using a list obtained directly from DESE and will be discussed separately. To acquire the district-level data, the "School District List" was downloaded from the school directory section of the DESE website. The building-level data was formed by combining the "School Building List" from this same website and a file containing additional information provided directly from DESE to the research staff. In the initial stages of sampling, the data used contained

the 2006-2007 school year information. With the update of the DESE website to the 2007-2008 school year information, (October 16, 2007) the research team merged the school directory downloads to make use of the most recent mailing addresses. In cases that a school building was missing a value for a variable of interest, the research team used DESE's website, National Center for Education Statistics (NCES) data, the school district/building website, or direct contact with DESE to fill in the information. The district-level data contains 554 cases: 552 districts from the download, The Missouri School for the Blind, and The Missouri School for the Deaf. The building-level data contains 2,424 cases.

Description of Variables

Each data source contained a DESE-assigned county district code and school number for each building which served as the method for matching school districts/buildings across datasets. For the few school buildings with a discrepancy in the DESE-assigned code, the research team checked multiple variables within the case to verify consistency. District name, school building name, mailing address, phone number, fax number, email address, principal name, superintendent name, school board president and secretary names, and the number of teachers per building were obtained from the 2007-2008 school directory. The DESE-provided dataset contained grade span (the grades within each school building), percent of students receiving free and reduced lunch, locale code, and enrollment by fourth, seventh, and eleventh grades by school building. The dataset also included several other variables, such as the breakdown of student populations by race/ethnicity and years of experience for principals. These additional variables did not play a direct role in the sampling plan but are available for future analyses.

Approach

The sample size calculations are for estimating a proportion to within a specified margin of error, for a finite population of specified size. This sampling plan uses 5% for the desired upper bound on the margin of error, with a confidence coefficient of 95% for all target groups. The DESE Technical Advisory Committee suggested conducting sample size calculations on other quantities, such as means, sample variances, and covariances of the Likert-scale responses. Without prior data, it is difficult to carry out these calculations; however, the research staff over-sampled for each survey and given the high response rates and use of retrospective statistical adjustments for the margin of error, we are confident the results will be representative of the surveyed groups.

Missouri has 524 public school districts, 28 charter schools, the Missouri School for the Blind, and the Missouri School for the Deaf. These schools encompass large urban areas (St. Louis and Kansas City) and rural areas with counties containing fewer than 5,000 people. Both the size and socioeconomic composition of school districts can play a role in the resources and constraints of those school districts as underscored by focus group participants in the initial phase of this project.

A simple random sample of school districts could fail to account for variations in either geographic location or socioeconomic status, important factors in Missouri's sociopolitical landscape. In order to account for these differences, the sampling plan draws from school building-level data and stratifies the data by locale code when appropriate. The locale codes ensure representation of all community types and a broader geographic distribution of the schools throughout the state. Table 1 illustrates the total number of buildings by locale code in Missouri.

Table 1. Number of Buildings by Locale Code

		Frequency	Percent
1	Large City – central city of a CMSA or MSA[1] with population ≥ 250,000	281	11.6%
2	Mid-Size City – central city of a CMSA or MSA with population < 250,000	145	6.0%
3	Urban Fringe of Large City – defined as urban by the Census Bureau and located within a CMSA or MSA	551	22.7%
4	Urban Fringe of Mid-Size City – defined as urban by the Census Bureau and located within a CMSA or MSA	77	3.2%
5	Large Town – located outside of a CMSA or MSA with population ≥ 25,000	27	1.1%
6	Small town – located outside of a CMSA or MSA with population < 25,000 and ≥ 2,500	346	14.3%
7	Rural Metro – located within a CMSA or MSA of a large or mid-size city	258	10.6%
8	Rural Non-Metro – located outside a CMSA or MSA or a large or mid-size city	671	27.7%
	Missing Locale Code[2]	68	2.8%
	Total	2,424	100.0%

These numbers include all facilities responsible for educating public school students in Missouri. As discussed in the following section, the number of buildings used varied by target group based on a set of established criteria.

Exclusion Criteria

MAP and NCLB affect all public school buildings in Missouri, but the level of involvement with MAP testing varies due to the grade span of a school building, the composition of the school population, and the role of a school building within a district, for example whether the building is a career center or the building of primary attendance. This research project sought opinions from stakeholder groups with the most direct involvement in MAP testing. Consequently, the research team developed a list of exclusion criteria for each stakeholder group. These exclusion criteria, outlined in Table 2, varied in application for each survey group. The sampling discussion for the different groups identified for this project notes these variations.

[1] Consolidated Metropolitan Statistical Area or Metropolitan Statistical Area

[2] Those cases with missing locale codes were excluded according to the criteria set for each group to be sampled, so it was not necessary to determine the locale code for each case.

Table 2. Categories of Exclusion

Category	Description	Number of Buildings
Early childhood	Early childhood education centers (pre-kindergarten) or early elementary school buildings that contain up to the second grade	113
Centers	Technical career centers and gifted centers – student MAP tests reported by other school building in the district	57
Schools without an eligible grade (4th, 7th, or 11th)	Middle schools serving grades 5 and 6; Buildings with a single grade such as 9th grade	77
New or No Reporting	New school buildings; school buildings that did not report MAP tests scores in the 2006/2007 school year; special education cooperatives	62
Severely handicapped student population	36 State Schools for the Severely Handicapped and the Bolivar School for the Severely Handicapped	37
Missouri School for the Blind	Missouri school district for students who are blind or visually impaired	3
School reporting no teachers	No teachers reported for the school building	9
Transitory student population	Hospitals, Department of Corrections, Department of Youth Services, and Juvenile Justice Centers	74

Inclusion Criteria

The research team attempted to include as many school buildings as possible in the sampling frame for each group to be surveyed. The student population uses the highest number of exclusion criteria (7 of the above) while the total number of criteria applied to other groups ranged from zero to four. Following is a more detailed discussion of the different exclusion rationale as it applies to different target groups.

Students

Variations in the grade levels students participate in NCLB-accountable MAP testing results in some students going several years between testing cycles. The research team targeted grades that had taken a MAP test in the previous school year, including an elementary, middle/junior high, and high school grade. Given these criteria, the 4th, 7th, and 11th grades were selected. Table 3 shows the total number of students in the targeted grades and the number of buildings containing those grades.

Table 3. Number of Students and Buildings by Grade

	Total Number of Students	Total Number of Buildings
4th grade	65,518	1,145
7th grade	70,099	701
11th grade	67,239	543
Total	202,856	2,389

School buildings excluded from the student population included early childhood, schools without an eligible grade, centers, transitory student populations, and new or no reporting of MAP scores. The research team excluded schools for the severely handicapped and the Missouri School for the Blind for reasons related to survey administration. While students in the schools for the severely handicapped are part of the MAP-accountable population, the research team determined that teacher administration of the surveys for these students would be unduly burdensome. Future administrations of the survey may include the School for the Blind (if randomly selected), but the short time line prevented the research team from designing surveys in large print and Braille forms for this first survey administration. After applying these exclusion criteria to the student population, a total of 2,001 school buildings were eligible for selection to participate in the student survey.

After determining the number of eligible school buildings, the sampling approach stratified the remaining buildings into categories based on the locale code by creating a "tag" variable indicating which of the targeted grade levels each building contained (see Table 4). The proportion of school buildings in each locale code served as the basis for developing a representative sample by locale code for the student population in each grade.

Table 4. Buildings by Locale Code and Grade Level

	Locale Code								
Grade	Urban 1	2	3	4	5	6	7	Rural 8	Total
4th	160	93	292	34	15	94	119	338	1,145
7th	88	24	106	14	4	73	79	313	701
11th	40	17	96	13	3	71	60	243	543
Total	288	134	494	61	22	238	258	894	2,389[3]

One consideration of this evaluation is to account for socioeconomic status as a potential factor impacting MAP/NCLB. Although locale codes may be correlated somewhat with socioeconomic status, they are not sufficient on their own. In education literature, free and reduced lunch (FRL) rates are often used as a proxy of the socioeconomic status of the students in a school building and remove the need to directly ask students their socioeconomic status. Thus, the research team created a new variable using the continuous variable for free and reduced lunch rate in the dataset to divide the eligible cases into quartiles representing low to high FRL in a school building.

Using the FRL quartile and locale code, each eligible building was assigned to one of 32 cells for each targeted grade. The building-level dataset was used to determine the percentage of students by locale code; then the number of students in each of the 32 cells was calculated in proportion to the total number of students in that locale code to determine the final distribution for the student mailing (see Tables 5, 6, and 7).

[3] The total number of buildings by locale code and grade level is larger than the total number of eligible buildings (2,001) because buildings may contain more than one grade and are eligible to be sampled for any of the targeted grades which they may contain.

Table 5. Percentage of Fourth Grade Population[4]

FRL Category	Locale Code							
	Urban 1	2	3	4	5	6	7	Rural 8
Low 1	14%	38%	53%	22%	33%	1%	48%	2%
2	10%	11%	21%	52%	14%	18%	36%	23%
3	7%	22%	11%	9%	23%	61%	14%	45%
High 4	69%	29%	15%	17%	30%	20%	2%	31%
Total	100%	100%	100%	100%	100%	100%	100%	101%

Table 6. Percentage of Seventh Grade Population

FRL Category	Locale Code							
	Urban 1	2	3	4	5	6	7	Rural 8
Low 1	14%	32%	53%	38%	6%	7%	64%	6%
2	9%	25%	26%	39%	61%	43%	31%	31%
3	14%	28%	5%	22%	32%	41%	5%	45%
High 4	63%	15%	16%	1%	0%	8%	1%	18%
Total	100%	100%	100%	100%	99%	99%	101%	100%

Table 7. Percentage of Eleventh Grade Population

FRL Category	Locale Code							
	Urban 1	2	3	4	5	6	7	Rural 8
Low 1	17%	57%	76%	56%	67%	29%	79%	14%
2	8%	31%	8%	44%	33%	61%	18%	44%
3	16%	11%	13%	0%	0%	8%	3%	35%
High 4	59%	1%	3%	0%	0%	2%	1%	7%
Total	100%	100%	100%	100%	100%	100%	101%	100%

School buildings are the vehicle for delivery of student surveys. While the research team could send all of the student surveys to one school to reach the necessary number of completed surveys for many categories, the team determined this approach would introduce bias into the results. Rather than have all of the surveys needed for analysis come from a building with a high population of students in a particular grade level, the sampling strategy established parameters to ensure adequate representation across buildings. These parameters require that at least three buildings within a cell receive a packet of surveys and that each of those packets contain a maximum of 30 surveys. The number of surveys set by the proportion of free and reduced lunch categories was established within a locale code by rounding to a multiple of 30. The research team then divided the number of students who should receive the survey by 30 to determine the number of school buildings in each category that would receive a packet of surveys. A goal of 1500 returned surveys per grade level was established, with the understanding that the sampling rules would result in a higher number of surveys distributed for each grade. Using the distribution of buildings across the 32 cells (see Tables 8, 9, and 10) classified by the free and reduced lunch rate and locale code, the buildings to receive the student survey packets were randomly selected.

[4] Total percentages do not always add to 100% due to rounding.

For school buildings with less than 30 students in a grade, the survey packet contained a survey for each student. To reach the 30-student threshold, an additional school from the random selection received a survey packet. The research team repeated this process until reaching the minimum number of surveys needed for the category. Some cells contain three or fewer school buildings; in these cells, each school building received a packet of surveys. From the total of 2,389 eligible school buildings, 301 schools received student survey packets which contained a total of 7,410 surveys.

Table 8. Number of Fourth Grade Buildings by Free and Reduced Lunch and Locale Code

FRL Category	Locale Code								
	Urban 1	2	3	4	5	6	7	Rural 8	Total
Low 1	14	24	141	9	4	1	52	9	254
2	12	12	58	12	2	17	41	67	221
3	12	20	37	4	4	54	23	148	302
High 4	122	37	56	9	5	22	3	114	368
Total	160	93	292	34	15	94	119	338	1,145

Table 9. Number of Seventh Grade Buildings by Free and Reduced Lunch and Locale Code

FRL Category	Locale Code								
	Urban 1	2	3	4	5	6	7	Rural 8	Total
Low 1	5	5	53	5	1	3	43	20	135
2	4	5	30	4	2	31	24	103	203
3	12	8	8	3	1	28	10	127	197
High 4	67	6	15	2	0	11	2	63	166
Total	88	24	106	14	4	73	79	313	701

Table 10. Number of Eleventh Grade Buildings by Free and Reduced Lunch and Locale Code

FRL Category	Locale Code								
	Urban 1	2	3	4	5	6	7	Rural 8	Total
Low 1	3	7	64	7	2	20	39	24	166
2	2	5	13	4	1	38	15	107	185
3	9	3	13	1	0	8	4	88	126
High 4	26	2	6	1	0	5	2	24	66
Total	40	17	96	13	3	71	60	243	543

To summarize the student sampling approach, grades 4, 7, and 11 were selected as the targeted grades to receive the surveys. Within each grade, the student population was distributed into one of 32 cells of an 8 by 4 table representing location and SES as approximated by the percent of students receiving free and reduced lunch. The proportion of students within these cells determined the number of surveys needed for each locale code by percent FRL. This proportion was translated to the number of buildings that would be randomly selected to receive a survey packet to be administered in a classroom of the building principal's selection.

Principals

School buildings excluded from the principal population included early childhood, centers, transitory student populations, and new or no reporting of MAP scores. These criteria place the number of

school *buildings* in Missouri eligible for the principal survey at 2,119 (see Table 11). The exclusion also included principals who also serve as the superintendent; these principals had the option of completing the superintendent survey. The resulting number of *principals* in Missouri eligible for the survey is 2,074.[5]

Based on the total number of *buildings* eligible for the survey, the research team identified a goal of 400 completed surveys, a number that provides enough responses for analysis of principals as a group while minimizing the costs of administration. The proportion of school buildings by locale code then determined the number of completed surveys needed in each category for analysis. The research team anticipates a 35 percent response rate after two waves requiring a total of 1,257 mailed surveys.

Table 11. Number of Principals by Locale Code

	Locale Code								
	Urban 1	2	3	4	5	6	7	Rural 8	Total
Number of Buildings	248	135	488	64	24	267	241	652	2,119
Percent of Total	12%	6%	23%	3%	1%	13%	11%	31%	100%
Completed Surveys Needed	47	25	92	12	5	50	45	123	399

Teachers

As with students, the delivery mechanism for the surveys is through a school building, but the sampling unit is the teacher. School buildings excluded from the teacher population include early childhood, centers, new or no reporting of MAP scores, and transitory student populations. The population frame excluded teachers from the School for the Blind due to previously discussed administration barriers. The exclusion process also eliminated school buildings that did not report a teacher population. The resulting number of school buildings eligible for the teacher survey is 2,107.

After identifying the eligible school buildings for the teacher survey, the research team relied on the DESE dataset to assess the number of teachers in each locale code. Based on the total number of teachers eligible for the survey, the research team identified a goal of 1000 completed surveys. The number of teachers in each locale code then determined the proportion of completed surveys necessary for statistical analysis (see Table 12).

Table 12. Number of Teachers by Locale Code

	Locale Code

[5] The principal and teacher totals eligible for sample selection are one greater than the student total with adjustments for exclusions because upon further examination one school was found to be a new building. This building was not selected for either the principal or teacher sample.

	Urban1	2	3	4	5	6	7	Rural 8	Total
Number of Teachers	9,008	5,559	22,910	2,645	1,021	10,312	8,799	16,000	76,254
Percent of Total	12%	7%	30%	3%	1%	14%	12%	21%	100%
Completed Surveys Needed	113	82	309	44	5	123	142	182	1000

The sampling strategy for teachers was carried out under similar parameters as the student surveys to ensure adequate representation across buildings within a locale code. These parameters require that at least three buildings within a cell receive a box of survey packets for each teacher in the building. The research team used SPSS to randomly select five percent of the school buildings within each locale code after verifying that the number of buildings actually needed was less than five percent. This resulted in more schools included in the sample than necessary but provided consistency in the selection process. This process also allowed the team to obtain the necessary number of schools without repeated random sampling to achieve the needed number of school buildings because of the differing number of teachers in each school building. The research team verified inclusion of an elementary, junior high, and high school building in each locale code to ensure all teacher types had the opportunity to participate for each locale code. Each randomly selected school building received a box of survey packets with one survey packet for each teacher in the school, as determined by the dataset.

Each school building received one wave of surveys, reducing the anticipated response rate for teachers. Further, each teacher receiving a survey was responsible for returning the completed survey in a provided postage-paid return envelope. This additional step had the potential to reduce the response rate in a typically high resonance population given the subject of the survey. To achieve the necessary response rate to assess Missouri teachers as a group the research team distributed a total of 3,582 survey packets through 96 school buildings.

Superintendents

The population of public school district superintendents in Missouri (554) allowed the research team to include each in the survey administration. The findings from the superintendent's survey are reported in terms of parameters rather than generalizing to the population through statistics.

School Board Members

The school board member survey was mailed to the 540 school districts in Missouri.[6] This number does not include the Missouri School for the Blind or the Missouri School for the Deaf, as these districts do not have school boards. Two school board members for each district, the president and the secretary, received a survey packet for a total of 1,080 surveys sent. This approach ensures that each public school district in Missouri had the opportunity to participate and that there was equal representation among school boards. This equal representation would not have been possible with a simple random sample, given the differing sizes of school boards between districts. Further, by mailing to these specific titles, the research team can direct the surveys to school board members who are more likely to have experience with NCLB-related concerns in education. This selection strategy takes a census approach, as the surveys were sent to every known member of a sub-

[6] The school board mailing list was obtained from the 2006/2007 district directory, which does not include 12 charter school districts.

population of Missouri school boards by the titles of president and secretary. Despite the benefit of representation this strategy provides, it is accompanied by the limitation that this sub-population cannot be considered representative of all school board members in Missouri.

Parents

The parent sample follows the same exclusion criteria as the student sample, the only exceptions being that the State Schools for the Severely Handicapped and the Bolivar School for the Severely Handicapped are eligible to be selected. There are 2,038 school buildings eligible for selection to receive a request for parent address lists.

The parent sample also uses a strategy similar to the students but with the use of only the locale code and grade level as the stratification criteria. Ideally, parents would not be stratified by grade level, but the method of requesting parent addresses through the principal required the research team to specify a group of addresses. By requesting the addresses for all 4th grade students in a building, the principal received more specific instructions than if the research team requested, for example, addresses for 100 parents from the total 3rd to 12th grade student population. This approach also discouraged principals from providing addresses for highly involved parents, such as a parent volunteer list, which might be more easily accessible but could skew results. The targeted grade levels also aim for parents who have children with some level of experience with MAP tests across elementary, middle/junior high, and high school buildings.

The total number of 4th, 7th, and 11th grade students in each locale code provided the proportion of parents to contact in each locale code. The research staff created the mailing list for the parents by contacting twelve randomly selected school buildings within each locale code, four buildings for each grade level. The research team anticipated difficulties receiving the parent address lists from schools so the number of buildings contacted provided some assurance that the total number of parent addresses obtained would meet the needs of the sampling frame.

After sending an email to the superintendent of the district for the selected school building to inform him or her of the project, the research team then contacted the principal of the building by email to request a list of parent addresses for all students in either grade 4, 7, or 11. In some cases, the research team requested multiple grade levels from a school building. The request letter to principals listed the information needed by the research team including child name and complete mailing address.

All of the parent addresses will be combined into a dataset and then labeled with the locale code and grade level (4, 7, 11) under which the address was obtained. The mailing list retains any duplicates within school districts so a parent of a 4th grader who has a child in 7th grade has the possibility of selection for either or both child(ren). The research team will then use SPSS to randomly select the parents from the address list. As noted in the student population section, the number of students in the 4th, 7th, and 11th grades are roughly equal for the state of Missouri (refer back to Table 3). The research team reviewed the random selection process for parents to verify that each of these grades was roughly a third of the total sample.

DESE / RPDC

The research team obtained a list of DESE and RPDC employees directly from DESE. Unlike the other surveys in this project, the DESE/RPDC survey was web-based. The relative ease of obtaining the email addresses and the knowledge that the population has easy access to the Internet allowed the research team to take this approach. The administration method and known population for this survey allowed the research team to use a census approach. The findings from the DESE/RPDC survey will be reported in terms of parameters rather than generalizing to the population through statistics.